

Claims

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1      Process for producing elastane fibres by the dry spinning process or the wet spinning process using spinning solutions of elastane recycling material, optionally with the addition of fresh elastane solution, characterised in that

5      a) the waste obtained from elastane material, in particular from elastane fibres, is cut up, in particular to a cut length of at least 0.1 mm, preferably to a cut length of at least 1 mm, particularly preferably to a cut length of 2 to 10 mm, most preferably to a cut length of 3 to 5 mm,

10     b) the cut elastane material and 0.1 to 2 wt.%, based on the content of solid elastane, of a secondary aliphatic amine are introduced into the spinning solvent,

15     c) the mixture of cut elastane material, spinning solvent and secondary aliphatic amine is heated at a temperature of 60°C to 150°C, with homogenisation,

20     d) the resulting homogeneous elastane spinning solution is prefiltered,

25     e) optionally with the addition of fresh elastane solution, the elastane spinning solution is mixed at 70°C to 140°C with a fresh elastane solution, preferably having the same solids concentration, in any mixing ratio and heating is continued,

f) the resulting spinning solution is cooled to a temperature of at not more than 70°C, preferably from 50°C to 70°C, and filtered once more,

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g) the finished spinning solution is optionally remixed, for example, by stirring, degassed and subsequently spun into elastane fibres by the dry spinning process or the wet spinning process.

5 2. Process according to claim 1, characterised in that the elastane waste consists of both elastanes based on polyether and elastanes based on polyester, or of wastes of mixed polyether- and polyester-containing elastanes in any mixing ratio.

10 3. Process according to claim 1 or 2, characterised in that the secondary aliphatic amine used is diethylamine (DEA), in a quantity preferably of 0.3 to 1 wt.%, in particular preferably of 0.5 to 0.8 wt.%, based on solid elastane.

15 4. Process according to claims 1 to 3, characterised in that the concentration of the finished spinning solution in step g) is from 22 to 45 wt.%, preferably from 30 to 40 wt.%.

5. Process according to claims 1 to 4, characterised in that dimethylacetamide is used as the spinning solvent.

20 6. Process according to claims 1 to 5, characterised in that the elastane spinning solution is mixed with a fresh elastane solution in step e) for a period of 5 to 60 minutes.

25 7. Process according to claims 1 to 6, characterised in that the total mixing time in steps b) and c) together is at least 10 minutes, preferably from 60 to 150 minutes, particularly preferably 90 to 120 minutes.

8. Process according to claims 1 to 7, characterised in that the solution temperature in step c) is from 80°C to 120°C.

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5      Process according to claims 1 to 8, characterised in that in the case where a mixture of waste elastane solution and fresh elastane solution is used, the required addition of secondary amine, in particular of diethylamine, to the fresh elastane solution is carried out not in step b) but in step e) and in the form of a stock batch of secondary amine and fresh elastane solution.

10     10. Process according to claims 1 to 9, characterised in that the recycling spinning solution and the fresh solution are preferably mixed together in a static mixer, preferably at 70°C to 140°C, in particular at 100°C to 120°C, for a period of 5 to 30 minutes and the spinning solution is subsequently cooled to 50°C to 70°C.

15     11. Process according to claims 1 to 10, characterised in that the solids content of the recycling spinning solution in proportion to the solids concentration of the total spinning solution comprising recycling spinning solution and fresh elastane solution is at least 10 wt.%, preferably at least 20 wt.%.

20     12. Process according to claims 1 to 11, characterised in that the spinning of the spinning solutions by the wet spinning process is effected from spinnerets having a nozzle hole diameter of 0.10 to 0.3 mm, preferably of 0.1 to 0.2 mm.

25     13. Process according to claims 1 to 12, characterised in that the elastane material in step a) is introduced in portions, in particular via a metering/weighing device, preferably at a rhythm of 1 to 10 kg/minute, particularly preferably 3 to 5 kg/minute, into the vortex created by an agitated disperser in the previously prepared spinning solvent.

30     14. Elastane fibres obtained from a process according to one of claims 1 to 13, in particular with a titre of up to 10,000 dtex, characterised in that their fibre strength is 0.5 to 0.95 cN/dtex, preferably 0.7 to 0.9 cN/dtex, and the elongation at tear is 500 to 750%, preferably 550 to 700%.

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15. Device for carrying out the process according to one of claims 1 to 13, consisting at least of a heatable mixing tank 1 with an inlet 2, 6 for solid material, a mixer 3 and a dispersing unit 4, 5, of a mixing zone 7 with static mixing elements, connected downstream of the mixing tank 1, of a cooling zone N with mixing elements and of a filtering unit 12 for subsequently filtering the prepared elastane spinning solution.

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16. Device according to claim 15, characterised in that the dispersing unit 4, 5, consists of at least one, in particular two, agitated dispersers.

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17. Device according to claim 16, characterised in that the agitated disperser(s) 4 is/are equipped with screw-type segmented appliances 5.

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18. Device according to claim 16, characterised in that the agitated disperser(s) 4 is/are equipped with screw-type segmented appliances 5 selected from suction cutters, webbed rings, kneading spirals and multiple current appliances.

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19. Device according to one of claims 14 to 17, characterised in that the mixer 3 is an anchor mixer and the mixing tank 1 is provided with an additional cleaning device for the internal fittings of the mixer 3.

*Addl A2*